



**ATTENTION:** To reduce the risk of electric shock, do not remove cover. Refer servicing to qualified service personnel. Disconnect the mains supply before connecting or disconnecting the links to the battery.



Read the Instruction Manual carefully before use. Verify that the selected charge curve is suitable for the type of battery You have to re-charge.

#### Explanation of Graphical Symbols:



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the equipment's enclosure; that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.

This product is covered by warranty.  
The relative warranty certificate is attached to the Instructions Manual.  
If the Manual is not provided with this certificate, please ask your retailer for a copy.  
For further references, please write the serial number in the proper space:

**Serial No.**

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ZIVAN S.r.l. will be not responsible for inaccuracies contained in this manual due to print or translation errors. ZIVAN S.r.l. has the right to make changes or improvements, also for the user interest, without prejudicing the essential characteristic of operation and safety.

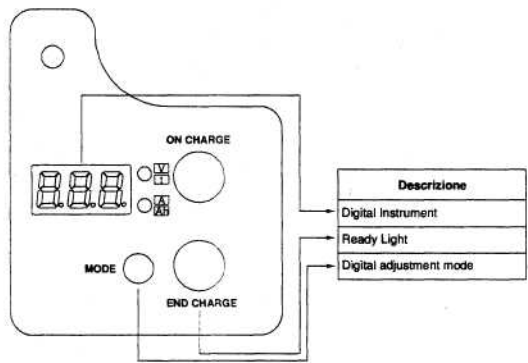
### Installation and safety instructions

Battery charger NG5-7-9 plus has been designed to provide safety and reliable. It is necessary to observe the following precautions in order to avoid damage to persons and to the battery charger.

- Read the installation instructions contained in this Manual carefully. For further information put the Manual in a proper place.
- Fix the battery charger to a stable surface through the appropriate holes inserted on the fixing flanges. In case of installation on a vehicle it is advisable to use anti-vibration supports.
- Preferably the charger should be installed in the vertical position with the fan facing up. The horizontal installation is allowed. Never install in the vertical position with the fan facing down.
- Ensure all ventilation ports are not obstructed, to avoid the overheating. Do not put the battery charger near heat sources. Make sure that free space around the battery charger is sufficient to provide adequate ventilation and an easy access to cables sockets.
- Protect the battery charger from ingress of water. Do not pour liquids inside the case.
- Verify that the available supply voltage corresponds to the voltage that is stated on the battery charger name plate. In case of doubt, consult a retailer or local Electric Supply Authority.
- As protection device in the input of the battery charger You can both use a switch of AC class, but it is warmly recommended to use one of A class or even better one of B class.
- For safety and electromagnetic compatibility, the battery charger has a 3-prong plug as a safety feature, and it will only fit into an earthed outlet. If you can't plug it in, chances are you have an older, non-earthed outlet; contact an electrician to have the outlet replaced. Do not use an adapter to defeat the grounding.
- To avoid damaging the power cord, do not put anything on it or place it where it will be walked on. If the cord becomes damaged or frayed, replace it immediately.
- If you are using an extension cord or power strip, make sure that the total of the amperes required by all the equipment on the extension is less than the extension's rating.
- Disconnect the mains supply (turn off the switch) before connecting or disconnecting the links to the battery.
- To recharge Lead Acid batteries: WARNING: Explosive Gas - Avoid flames and sparks. The battery must be positioned in a correctly cooled place.
- Do not use to charge batteries installed on board of thermal engine cars.
- Avoid recharging of non-rechargeable batteries.
- Verify that the nominal voltage of the battery to be re-charged corresponds to the voltage stated on the battery charger name plate.
- Verify that the selected charging curve is suitable for the type of battery to be re-charged, in case of doubt, consult Your retailer. ZIVAN S.r.l. will not accept any responsibility in case of mistaken choice of the charging curve that may cause irreversible damage to the battery.
- In order to avoid voltage drop, thereby assuring 100% charge at the battery, the output cables must be as short as possible, and the diameter must be adequate for the output current.
- Do not try to service the battery charger yourself. Opening the cover may expose you to shocks or other hazards.
- If the battery charger does not work correctly or if it has been damaged, unplugged it immediately from the supply socket and from the battery socket and contact a retailer.

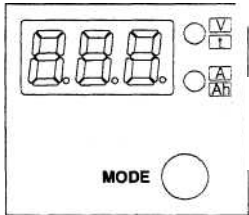
NG5-7-9 CAN Bus Interface

Visualization



Digital Instrument

During the first minute after starting, on the digital instrument it will be displayed the value of the voltage drop on the output cables. To set the compensation value made by the charger to balance the voltage drop on the cables please follow the procedure "Compensation setting of the voltage drop on output cables."



After one minute from the starting the digital instrument will display the string of the following parameters:

- **BATTERY VOLTAGE** (two-tone red upper led).
- **CURRENT** provided by the charger (two-tone red lower led).
- **TIME** in hours lacking to the end of charge (two-tone green upper led).
- **Ah** supplied (two-tone green lower led).
- **CONNECTED GADGETS** (no two-tone led on - only on a MASTER battery charge).

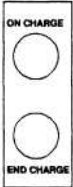
By pressing once the MODE button, the parameters' sequence is blocked and it will be kept the last value displayed. By pressing again on the MODE button the sequence of parameters restarts.

Compensation setting of the voltage drop on output cables.

During the lapse of time along which the digital instrument displays the voltage drop on the output cables (first minute after starting) it is recommended to follow the below-mentioned procedure:

1. Gauge the voltage drop at the ends of the output bars of the battery charger (close to the cover).
2. Gauge the voltage on the battery poles.
3. Make the difference between the two values to get the voltage drop compensate.
4. Press shortly the MODE button (ROLL) until reaching the nearest voltage value to the desired one: it is possible to ROLL parameters between 0,0V e 1,5V with steps of 0,1V.
5. Press long the MODE button (ENTER) to confirm.

Ready Light



Charging status and current pha

PHASE	RED LED	GREEN LED
Phase 1	On	Off
Phase 2	On with short flashing	Off
Phase 3	On	On with short flashing
Phase 4	On with short flashing spegnimenti	On with short flashing
Phase5-Phase6	Off	On with short flashing
End of charge	Off	On

When using the remote visualisation through two-tone LED (AUX F - Pin 1 e 2), the following signals are valid:

PHASE	RED	GREEN	YELLOW
Phase 1	On	Off	Off
Phase 2	On with short quenching	Off	Off
Phase 3	Off	Off	On
Phases 4-5-6 & End charge	Off	On	Off
S/S or alarm	Off	Off	Off

IMPORTANT: according to the charging curve used maybe some phases are lacking.

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## NG5-7-9 CAN Bus Interface



### Charging curve selection

You can press the MODE button according two modalities:

1. Long pressure (at least 1 second): along the battery charger setting it means ENTER
2. Short pressure (less than 1 second): along the battery charger setting it means ROLL

#### Setting:

1. While pressing the MODE button light on the equipment.
2. **ROLL**: select the **branch** type:
  - 0 corresponds to a MASTER unit charger (connected with one or more SLAVES units).
  - from 1 to 8 it gives the ID of the SLAVE (used together to a MASTER).
  - 9 identifies a STAND-ALONE charger (used as a single unit).
3. **ENTER**: **branch** type confirmation. Next selection is choose the **Battery type** (Lead acid type corresponds to BA1 otherwise Gel corresponds to BA2).
4. **ENTER**: **Battery type** confirmation: next level is to select the **Charging curve**.
5. **ROLL**: select the desired **Charging curve**.  
Availability is on 4 charging curves:
  - a. CU1: IUla curve;
  - b. CU2: IUlU0 curve;
  - c. CU3: power supply;
  - d. CU4: programmable curve (eg. *desulphation*).
6. **ENTER**: **Charging curve** confirmation: now select the **Capacity**.
7. **ROLL**: **Capacity** selection.  
Starting point is a nominal value and by the ROLL you can select a value included between 50% and 140% of the nominal in steps of 10%. On the display it is shown the last capacity selected.
8. **ENTER**: **Capacity** confirmation: then you can select the **Recharging time** (in hours).
9. **ROLL**: **Recharging time** confirmed.  
Starting from a suggested **Recharging time** (according to the capacity chosen at the previous step) this time can only be increased up to 20 hours max.
10. **ENTER**: **Recharging time** confirmation: the battery charger goes to a stand-by modality waiting that the output cables being connected to the battery binding-clamps (if connections have been done already before starting the setting, once arrived at point 10 the charger immediately starts).

**Warning:** if some trouble or mistake may occur along setting procedure, switch off the battery charger by the rotary ON-OFF switch, then switch oh again by keeping pressed the MODE button and restart setting operation from the beginning.

### Alarms

When an alarm situation stopping the charge occurs, the display shows one of the information below according failure detected:

**<A>** **<alarm code identified with a 2 digits**

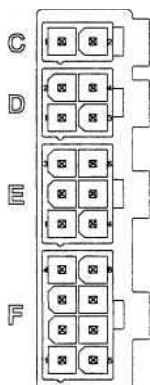
**code>** Alarm table list here following:

CODE	ALARM TYPE	DESCRIPTION	STOP
A01	LOGIC FAILURE #1	Trouble on current detection	YES
A02	CAN BUS KO	Trouble on CAN communication	NO
A03	WATCHDOG	Logic board mis-working	YES
A05	HIGH TEMPERATURE BATTERY	Battery over temperature (>55°C)	YES
A06	MISSING PHASE	Phase lacking	YES
A07	OVERCURRENT	Over current	YES
A08	HIGH TEMPERATURE	Battery charter high temperature	YES
A09	MISMATCH VOLTAGE	Internal failure	YES
A10	TIMEOUT	End of Phase 1 due to timeout	YES
A11	OVER DISCHARGE	Over discharged Battery	NO
A12	DEEP DISCHARGE	Deeply discharged Battery	NO
A13	BATTERY DISCONNECTED	Battery disconnection white charging	YES
A14	PUMP MISTAKE	Air pump mis-working	NO
A15	TH. SENSOR KO	Thermal sensor failure	NO

#### Notes:

- A05: The charge restarts once the battery temperature reaches a value lower than 50 °C.  
 A11: Notice on the battery status. By pressing the MODE button, a desulphation phase start followed then by the standard charge.  
 A12: Notice on the battery status. The standard charge is starting anyway  
 A15: With the thermal sensor out of order the battery charger behaves as if it was not equipped with by showing the A15 code on the display.  
 Each alarm except A02 and A13, gives also a 30' lasting audible alarm.

## Auxiliary contacts



Connector	PinN <sup>o</sup>	Description
C	1-2	Start/Stop Hardware
		-BATT.
D	1	Thermal sensor contact
	2	Temperature sensor
	3	Temperature sensor (- BATT)
	4	Air Pump contact
E	1	-BATT
	2	Air Pump sensor
	3	NC normally closed (AUX 1)
	4	NO normally open (AUX 1)
	5	COM common (AUX 1)
	6	LED R (remote visualisation)
F	1	LED V (remote visualisation)
	2	-BATT
	3	-BATT
	4	-BATT
	5	NC normally closed
	6	COM common2)
	7	NC normally open
	8	Further contact for digital input

Section	Function	Description (Unless otherwise
AUX1	Mains Presence	When the equipment is switched on, the contact Normally Open (NO) CLOSES and instead the contact Normally Closed (NC) OPENS.
AUX2	End of charge or Trickle Phase	When the Stop Phase or the No Stop Phase is reached, the contact Normally Open (NO) CLOSES and instead the contact Normally Closed (NC) OPENS.

Nominal current/Max instant current A	10/15
Nominal voltage/ Max voltage commutable Vac	250/250
Nominal load in AC1 VA	2500
Nominal load in AC15 (230Vac) VA	500
Single phase engine capacity (230 Vac) Kw	0.37
Break power in DC1:30/110/220 VA	100.3/0.12
Minimum mW commutable charge (V/mA)	500 (5/100)
Mechanical length AC/DC cycles	-/10x10 <sup>6</sup>
Electrical duration with nominal charge in A1 cycles	100x10 <sup>5</sup>
Isolation according EN 61810-1 2nd edition	2.5 kV/2
Isolation between coil and contacts (1.2/50 us) kV	4
Dielectric rigidity between open contacts Vac	1000

## ADDITIONAL FEATURES WITH AIR PUMP

## Standard Version

The Air Pump technology generates a re-mix of the acid inside the battery by a constant delivery of air pumping. The battery charger controls the air pump by an auxiliary contact (generally AUX1). An air injection cycle along all the charging period is held as per requirements of the battery specifications.

## Pressure sensor version

Further to the characteristics of the standard version it is also available an electronic circuit equipped with an air pressure sensor. At the beginning of the charging process, the sensor verifies that the pressure in the circuit is included in a definite window between a minimum and a maximum value (look at the following table). When an anomaly occurs the battery charger will modify the charging factor by effecting a charge without detecting and controlling the Air Pump

## Technical Features

Description	Symbol	Test Condition	Value and/or Range	Unit
Power absorbed by the Air Pump	PaD	Air Pump controlled	90	W
input fuse		Equipment interns	1,6	A
Maximal dimensions	axbxc	Without connecting cables	657x267x226	mm
Weight	.	Without connecting cables	17,5	kg
Air Delivery*	Q	Air Pump controlled	4:13	l/min
Available pressure range	Ap	Starting charging point	50 : 250	mbar

\* To know the effective air delivery please refer to the plate



This device is in conformity with the Low Voltage directive 2006/95/CE and EMC directive 2004/108/CE and their further modifications.

**TECHNICAL FEATURES**

Ta =25°C unless otherwise specified

**Mains side**

Description	Symbol	Test Condition	Value and/or Range	Unit
Supply Voltage Three-phase	Vin		400 + 15%	Veff
Frequency	f		50 + 60	Hz
Absorbed Maximum Current per phase	Ifmax	P = Pmax	10(NG5) 14(NG7) 18(NG9)	Aeff
Inrush Current		Vin=400Veff	<2,35	A
Power Factor	COS phi	P = Pmax	0,72	
Absorbed Minimum Power	Pinmin	End of charge	<10	W
Absorbed Maximum Power	Pinmax	P = Pmax	5 (NG5) 7 (NG7) 9(NG9)	kW

\* Maximum value per model. For the effective current absorption please refer to the charger's identification label.

**Battery side**

Description	Symbol	Test Condition	Value and/or Range	Unit
Output current	I		See curve	
Maximum output current	I1	Phase 1	See curve	A
Output current ripple		I = I1	< 5%	
Absorbed current	>a	Equipment turned off	<0,5	mA
Output voltage	U		See curve	
Constant output voltage	U1	Phase 2	See curve	V
Thermal compensation of output voltage	dU1/dT AT	Phase 2	-5 from -20 to +50	mV/CC-cell)
Operating range of Temperature Sensor			<C	
Output voltage ripple		U-U1	<1%	
Maximum power supplied	Pmax	U = U1, I = I1	4800 (NG5) 6300 (NG7) 7700 (NG9)	W
Output capacity	C	-	Depend on the model (>0,2)	mF

**General**

Description	Symbol	Test Condition	Value and/or Range	Unit
Operating range of temperature	AT	At each operation condition	from -20 to +50	°C
Maximum relative humidity	RH	Without connecting cable	90%	
Switching frequency	fc		20 ±5%	kHz
Efficiency	eta		> 87%	
Maximum size	axbxc		550x270x120	mm
Weight			9	kg
Enclosure class			IP20	

**Protection and Safety**

Description	Symbol	Test Condition	Value and/or Range	Unit
Insulation		Mains to Battery side	1250	VAC
Insulation		Mains side to Earth	500	VDC
Insulation		Battery side to Earth	500	VDC
Leakage current (EMC Filter)	I <sub>L</sub>	Supplied equipment	<7	mA
Input fuses	F1-F2-F3	Inside the equipment	20 (NG5) 20 (NG7) 25 (NG9)	A
Output fuse	F5	Inside the equipment	about 1,2x1	A
Minimum output voltage of operation (Battery Detector)	-	Equipment turn on	1,5	V/cell
Maximum output voltage	U <sub>rn</sub>	Phase 3 (U <sub>la</sub> - IUIU <sub>o</sub> )	See curve	V
Reverse output polarity		At the connection to the Battery	Protection provided by fuse F5	
Thermal protection of semiconductors (Temperature of Thermal Alarm)		Ta=55°C	100	
Safety Requirements (Rules)		EN60335-1, EN60335-2-29		
EMC Requirements (Rules)		EN55011, EN61000-4-2, EN61000-4-4		